SP - 1 Invited Speaker

Magnetic Microstructure And Spin Dynamics of Exchange-Coupled Thin Films – A PEEM Study

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Interface, surface and boundary properties play an increasingly important role in today's advanced magnetic devices, because of the rapid reduction in device volume and in magnetic layer thickness. Spin transport across magnetic and non-magnetic spacers, the interface anisotropy of magnetic thin films, and magnetic exchange coupling and bias are notable examples of interface phenomena that already are or will be important in technical applications. Over the last decade x-ray spectroscopy and microscopy using synchrotron radiation have become mature techniques, providing valuable information on the spin structure of complex magnetic systems. Element specificity, high sensitivity and high spatial resolution are the key skills of x-ray techniques. Here, examples of forefront research in thin-film magnetism using the X-ray Photoemission Electron Microscope (PEEM) at the Advanced Light Source will be presented..

X-ray microscopy was instrumental for the recent observation of the microscopic magnetic structure in exchange bias systems, consisting of a ferromagnet coupled to an antiferromagnet. We will present spectroscopic results and high-resolution domain images of the antiferromagnet, the ferromagnet and in particular of the interface moments, which link these magnetic layers and lead to bias. In the 2nd part of this presentation new opportunities for x-rays in ultra-fast dynamics studies will be discussed. We have developed a unique, optical laser - X-PEEM setup with currently 100 psec temporal and 50 nm spatial resolution. First results will be shown.

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